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WASHINGTON LETTER.

WASHINGTON, June 20, 1892.

THE GULF STREAM.—The Coast Survey recently issued Lieut. J. E. Pillsbury's researches on the Gulf Stream.* The paper contains a résumé of the world's knowledge of this subject, but is intended also to explain in detail recent advances, made possible by devices for taking observations from fixed points within the current of the stream, and for anchoring vessels in deep sea. Heretofore all the theories as to causes, and all the facts as to limits, velocity and direction, have been based entirely upon drift of vessels, or inferences drawn from temperature observations, character of the bottom soil, presence of gulf weed, tide rips, etc., the best of them only giving evidence of the existence of a current when it is strong, and not one of them giving anything conclusive or accurate as to velocity or direction, or an indication even of a regular variation, either daily or monthly.

Prof. Hilgard first attacked the problem and authorized the attempt to anchor off Jupiter Inlet. Lieut. J. C. Fremont, Jr., was detailed for the first investigation to be made from a vessel at anchor. He occupied five stations across the channel, the deepest anchorage being over 400 fathoms. This was in 1883–84. A few years later Lieut. Pillsbury occupied numerous stations, the deepest anchorage being 2,180 fathoms. The observations of Lieut. Fremont proved that the attempt to establish the axis of the stream by the thermometer was an error. It has since been found that a current may be flowing south with a much warmer temperature than when, a few hours later, it is flowing north. Lieut. Pillsbury demonstrates that while a warm current may be flowing in its customary place, its warm water may be transmitted by the wind and waves to other localities, without an accompanying current.

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* Appendix No. 10, Report for 1890. Washington, 1891. 4to, 162 pp., 24 plates.

The Gulf Stream, which Lieut. Pillsbury characterizes as the grandest and most mighty of any terrestrial phenomena,—a great ocean river characterized by a deep blue color, great clearness, and high temperature, "receives its waters," he says, "from the Atlantic, partly by means of a current driven by the force of the south-east trade-winds along the north-east coast of South America, and partly, by a current from the north-east trade-winds. The water, as a current, flows only through the passages between the Windward Islands, and not through the Anegada, Mona, or Windward Passages. All the water entering the Caribbean as described does not flow the length of that sea as a current, but a portion of it returns to the eastward through the passages, usually as a subcurrent. In addition, there is a large body of water thrown by the waves into the Caribbean through all the passages. The current found along the South American coast, between Trinidad and Curaçao, is chiefly produced by the escape of water thrown there by the waves, no large body permanently entering the sea through the passage south of Grenada. The flow of water across the Caribbean is of the same character as that found outside the islands, a scarcely perceptible current on the surface at first, but increasing in its velocity as the longitude increases. The water accumulated in the western Caribbean escapes into the Gulf of Mexico."

A brief review of theories concerning the Gulf Stream, in chronological periods, gathered and largely quoted from Lieut. Pillsbury's studies, will not be uninteresting.

In actual observations of the currents contributing to the Gulf Stream, Columbus was the pioneer. Lieut. Pillsbury advanced the happy thought on the eve of this quadri-centennial that it is probable that to the Gulf Stream in part the world owes the discovery of America. I quote: "Columbus, before undertaking his voyage of discovery toward the west, resided for some time on the island of Porto Santo, and it was here that he was shown a piece of curiously carved wood that had evidently drifted there from other lands. Strange woods and other floating objects were continually being thrown upon the shores of Norway, Scotland and Ireland, all of which, to a thoughtful mind like that of Columbus, must have induced the belief that there were other lands at no great distance to the west."

Columbus, in his voyages, made frequent soundings with deep-sea lines, and remarked the strong currents of the Caribbean Sea. Speculating on the cause, he thought "that the equatorial waters followed the motions of the heavens about the world—that is, the rotary motion by which the stars and air revolve about the globe (as was the opinion of the time), so also the water was supposed to partake of the same motion."

Peter Martyr, in 1515, and later, narrates the views of Andreas Moralis* and Ouidas; † and it is remarkable that they were so near the truth, considering how imperfect was their knowledge of the form or extent of the continent. For the next 65 years there was gradual extension of knowledge on the subject of ocean currents. About 1578 appeared the theory in "La Cosmographie," that the currents in the Straits of Florida were caused by the rivers emptying into the Gulf of Mexico. Nearly seventy-five years later (in 1650) Varenius gave the most complete description of currents which had been issued up to his time. The system of which the Gulf Stream forms a part he placed in a perpetual special motion of the sea, and describes it as a gigantic stream, beginning at the eastern capes of Brazil, flowing from south to north and ending toward Florida. Isaac Vossius, in 1663, ascribed the cause of the ocean circulation to the heats of the tropical sun attracting the ocean and at the same time increasing its bulk, forming, as it were, a long mountain of water. He concluded that the sun carried this mountain of water toward the South American shore, where it broke, and ran along the coasts. A French hydrographer, Fournier, some years later, propounded a theory almost the opposite. It was that the sun evaporated enough water in the tropics to make a deep valley, and therefore the water from the poles was forced to run towards the equator along the coast of Africa to replace the lost water.

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* Morales. † Oviedo.

The first published chart, showing the system of ocean circulation and the Gulf Stream, was given to the world in 1678 by Athanasius Kircher in his "Mundus Subterraneus"; and in 1685 Happelius published a chart of ocean currents, quite similar to Kircher's, in "Relationes Curiosæ." Both these charts are reproduced in Lieut. Pillsbury's paper.

For the next one hundred years no new theories were advanced. "The coasting captains and whalers, however, were gaining experience regarding the stream, and to the latter, more than all others up to the time of the Revolutionary War, Franklin was indebted for the information which led to the publication of his chart of the great ocean current." He gives his own account of his acquaintance with the peculiarities of the Gulf Stream, which he had obtained largely from a sea captain. The English sea captains, however, rejected his chart, which for political reasons he thereafter suppressed for a time. Franklin's theory of the Gulf Stream, in his own words, is: "This stream is probably generated by the great accumulation of water on the eastern coast of America, between the tropics, by the trade-winds which constantly blow there. It is known that a large piece of water, 10 miles broad and generally only three feet deep, has, by a strong wind, had its water driven to one side and sustained, so as to become six feet deep, while the windward side was laid dry. This may give some idea of the quantity heaped upon the American coast, and the reason of its running down in a strong current through the islands into the Bay of Mexico, and from thence proceeding along the coasts and banks of Newfoundland, where it turns off towards, and runs through, the Western Islands."

Contemporaneous with Franklin in investigating the phenomena of the stream, was Dr. Charles Blagden, of the Royal Army. These men were the first two to demonstrate the usefulness of the thermometer in their investigations. Col. Jonathan Williams, a nephew of Franklin, accompanied him on one of his voyages, and continued the thermometer experiments begun by his uncle. He published a work in 1799 on Thermometrical Navigation, which contained a chart of the Gulf Stream and the temperature of the water on adjacent banks.

From the time of Franklin and Blagden, for more than a century, all the investigation of ocean currents was based solely upon the thermometer and chronometer, and upon what in effect is the same as the latter, the drift of bottles.

Humboldt, in 1814, published a valuable description of the Gulf Stream, the result of his own observations. His theory was, that its force and direction depended, to a large extent, upon the changes in the trade-winds, and also, that the general torpidity of the ice in the Arctic in the winter, and its melting in the summer, influenced it. As to the direction of currents, he says: " Considering the velocity of the fluid elements which, in different latitudes, in consequence of the earth's rotation, is different, one should be tempted to think that every current from south to north ought to have at the same time a tendency to the east, and a current from the north to the south a tendency to the west." He published a chart of the Gulf Stream.

Capt. Scoresby investigated the northern extension of the stream, and discovered in the vicinity of Spitzbergen that an under stratum of water was generally warmer than at the surface.

Col. E. Sabine, a member of an expedition organized in 1822 to determine the figure of the earth, observed on ocean temperatures that he found in the Eastern Atlantic a body of water very much warmer than normal, and attributed this fact to an unusual elevation of the Gulf of Mexico and the Caribbean, due to abnormally strong trade-winds.

In 1832 the daughter of James Rennell published her father's " Investigation on the Subject of the Currents of the Atlantic Ocean." To Mr. Rennell, who had devoted his life to the subject of geography, and particularly to ocean currents, was given the task of compiling the data which had for many years been collected by the British Admiralty office. He adopted Franklin's theory as to the principal cause of ocean currents. He claimed, moreover, that there existed a change in the position and breadth of the column of warm water from time to time, which changes were sometimes very sudden and did not follow any regular course of season.

Arago believed, "that with respect to currents, the rotation of the earth ought principally to be taken into view, and that this, together with the cooling and warming of the water in the north and south, is the main cause of their more rapid or slower deviation and progress toward the east or west."

The next attempt to collect data on marine meteorology was made by Lieut. Maury. It is somewhat difficult to ascertain from his writings exactly what his ideas were as to the cause of the great ocean currents. Lieut. Pillsbury says: "His belief was, in effect, that differences of density caused the main currents, and that this might be modified by winds, rain, barometric pressure, evaporation, and the fauna and flora of the ocean."

The Coast Survey explorations of the Gulf Stream commenced substantially in 1845, under Prof. A. D. Bache; and with brief interruptions have been continued to the present time; under Lieut. (now Commander) C. H. Davis, Lieuts. George M. Bache, S. P. Lee, Richard Bache, T. M Craven, J. N. Maffit, Prof. Henry Mitchell, Robert Pratt, Commander Howell, Lieut. Commander Sigsbee, Commander John R. Bartlett, Lieuts. J. C. Fremont, Jr., and J. E. Pillsbury, all of the U. S. Navy. Each officer has contributed to the knowledge of this interesting question. The conclusions adopted by Prof. Bache from observations taken under his direction between 1854 and 1860 were as follows: "That between Cape Florida and New York the Gulf Stream is divided into several bands of higher and lower temperatures of which the axis is the warmest, the temperature falling rapidly inshore and more slowly outside. That between the coast and the stream there is a fall in temperature so abrupt, that it has been aptly called the 'cold wall.' Inside this wall is another increase, while outside the warmest band which is next the cold wall there is another warm and one other cold band." Concerning the theory of temperatures Lieut. Pillsbury says: "So much has been written on the question in times past, and the belief is so wide-spread at the present day, that the thermometer may be relied upon to indicate the presence of a current, that I wish to particularly accentuate the fallacy of the idea. . . . I can see no way of utilizing the thermometer for the purposes of accurate navigation, nor indeed of using it to indicate with certainty that the current is favorable or the reverse."

Lieut. Pillsbury concludes that there are two prominent theories; first, surface drift, due to permanent or semi-permanent winds, and, second, gravity, due to the differences of density of sea-water. He says: "I place myself with those who advocate the wind theory as the chief cause of the Gulf Stream proper, and of most ocean currents, but to differences in density we may attribute some variations in surface indications of the current. The prime mover, however, is generally wind, and I think my observations of the currents during the past five years will add much weight to the theory."

EARLY CHART OF LONG ISLAND SOUND.—Illustration No. 71 in the Coast Survey Report of 1890, just issued, is an elaborate chart of the North American coast from Cape Cod to the Navesink Hills, including Long Island Sound and approaches, constructed probably between the years 1715 and 1720, although there are indications that parts of it had an origin from 20 to 30 years earlier. The chart was recently discovered by Capt. Charles Hervey Townshend of New Haven, in the British Records office. He is of the opinion that it was made by a hydrographical survey party composed of British naval officers.

An examination of the chart affords additional confirmation of several now altered hydrographical features. As Captain Townshend remarks : "The chart furnishes positive proof of the existence of one of the closed passages that tradition says existed in early times through Cape Cod, and sustains the statement of Gosnold in 1602 that Cape Cod was then an island. That one of these passages remained open as late as 1717 is shown by a marginal note on the chart. In this very passage, in a salt marsh, has lately been discovered the remains of an ancient ship which was exhumed by the action of the sea May 6, 1863. It lay within the lands of what is now the town of Orleans." On the authority of Capt. William Foster of Brewster, Mass., Capt. Townshend states that the passages were closed about 150 years ago during a furious wind gale accompanied by a tidal wave, depositing sand hills sixty feet high in the salt marshes and lowlands.

Other changed features are : (1) The islands of Nantucket and Martha's Vineyard are shown as six islands. (2) The Rose and Crown Shoal, then marked "dry," has at this date (1891) twelve feet of water over it. (3) Across the east entrances of Long Island Sound are given the names of numerous islands—Fisher's, Gull, and Plum—forming with sunken reefs a continuous chain. (4) The connection of Governor's Island with Long Island by a narrow sand spit.

BERING'S FIRST VOYAGE.—Mr. William H. Dall's translation * of Vasili Bergh's abstract of Peter Chaplin's journal of Bering's first voyage to the region that

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* Appendix No. 19, Annual Report of the U. S. Coast and Geodetic Survey 1890. 4to. Washington, 1891. 18 pp., 2 maps.

now bears his name is an important addition to geographic literature. Mr. Dall has already published a translation of Capt. Bering's official report,[*] which previously was accessible only in the Russian tongue and in a rare and little-known periodical. Bergh found this journal of Chaplin in the archives of the Imperial Naval College, of which Chaplin was a cadet. From this, and other sources, he compiled a history of the voyage which was printed at St. Petersburg in 1823,[†] in the Russian language. The book is now exceedingly rare, not more than three or four copies being known.

The expedition, of which Chaplin's journal [‡] contains the narrative, was instigated and directed by Peter the Great under the following characteristic instructions to Capt. Bering:

> (1) There shall be built on the Kamchatka, or at some other place adjacent, one or two boats with decks.
>
> (2) With these boats, to sail along the coast which extends northwards and which is supposed (since no one knows the end of it) to be continuous to America.
>
> (3) And therefore to seek the point where it connects with America, and to go to some settlement under European rule; or, if any European vessel is seen, to learn of it what the coast visited is called, which should be taken down in writing, an authentic account prepared, placed on the chart, and brought back here.

According to Mr. Dall the expedition crossed northern Asia with wagons, barges, boats, sledges, or packhorses, observing latitude and variation of the compass when possible, and working out the longitude by the computation of directions and distances. They built a vessel at Okhotsk and transported themselves across the Okhotsk Sea to the western shore of Kamchatka; carried their stores by boat and sledges across that peninsula; built another vessel, in which they sailed northward along the coast to Bering Strait, and then returned to Kamchatka without success; then circumnavigated the southern part of that peninsula and returned to Okhotsk, and thence to St. Petersburg. The time occupied was from January 24, 1725 to March 12, 1730.

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[*] Nat. Geographic Mag. Vol. 2, pp. 111–169.

[†] First sea voyages of the Russians, undertaken for the settlement of this geographical problem—Are Asia and America united?—and performed in 1727–'28–'29, under the command of fleet-captain of the first rank, Vitus Bering. To which is added a short biographical account of Captain Bering and some of his officers. St. Petersburg, at the Imperial Academy of Sciences, 1823. 8vo, 3 prel. l. iv., 126 pp., 1 table, 1 map.

[‡] This journal is deposited in the archives of the Naval College of the Admiralty in St. Petersburg. Chaplin is said to have died at Archangel in Russia, in 1764, having attained the rank of Captain-Commander.—*Dall.*

After Bering's arrival in St. Petersburg, we are informed that he made a recomputation and revision of his data, and that the final chart was prepared at Moscow in 1731. This map, so interesting from its bearing on the geographical history of America and the progress of discovery, has never as a whole, until now, appeared in print; and it is only through the enlightened liberality of Baron Robert Klinckofström, of Stafsund, Sweden, who permitted this valuable relic to go beyond the seas, that American students, thanks to Prof. Dall and the Coast Survey, are now in full possession of this important document.

The original map measures 51 by 21 1-8 inches. The title, in a fine ornamental escutcheon, reads in translation: *Geographic chart from Tobolsk to the Chukchi* [Cape], *made during the Siberian Expedition under the command of Fleet-Captain* [a blank space]. The blank space in another known copy is filled in with *Bering.* It is in black and white, the mountains marked in, the only color being small green trees showing wooded country. There are quite a number of ethnological, topographic, hydrographic and magnetic details. The ornamental escutcheon is evidently drawn by a different hand in another kind of ink.

DESCRIPTION OF THE COAST SURVEY WORK.—No clearer exposition of the objects, scope, methods, means, rate of progress, and prospective views of the Coast and Geodetic Survey could be presented than that contained in the address of Mr. George Davidson at the ninth conference of the International Geodetic Association in Paris.*

The publications of the Survey have not been so numerous as would seem desirable, but their scope is wide, as is seen in the descriptions of total solar eclipses observed by its officers; in the observations of the transits of Venus in 1874 and 1882; in the recovery of the French station of the transit of Venus in 1769 at San José del Cabo, in Lower California; in the research upon the first landing place of Columbus; in the examination of the voyages of Ulloa, Cabrillo, Ferrelo, Vizcaino, and Drake on the Pacific coast between 1539 and 1603; in the report upon the irrigation systems of India, Egypt and Italy.

The practical character of its work is shown in the Coast Pilots, and in the Charts.

THE FISHING STREAMS AND LAKES OF WESTERN MONTANA AND YELLOWSTONE PARK. Prof. B. W. Evermann has done good service in his graphic delineations of the sportsman's paradise in Western Montana, contained in Senate Mis. Doc. No. 65, 52d Congress, 1st session.* He describes the locations and general characters of sixty-eight streams and lakes, their size, depth, current, source, course, temperature, clearness, etc. Discussions of the forests and other vegetation are given in detail in connection with the description of each stream or particular locality examined. What makes this narrative of special value is that it is accompanied by an itinerary.

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*Appendix No. 17, Annual Report of the U. S. Coast and Geodetic Survey, 1890. 4to, Washington, 1891. 16 pp.

Speaking of Swan Lake, distant from Flathead Lake about seven miles, though the distance by the river is three times as great, he says : " This beautiful lake, sixteen miles long, and varying from less than a mile to three miles in width, with its clear and sparkling waters, surrounded on all sides by dense evergreen forests, and studded here and there with small well wooded islands, rivals in beauty and picturesqueness any that the writer has ever seen ; and the beauty of the river from the lake to the outlet is unexcelled. The lake is said to be a favorite resort for swans, ducks, and geese. The fishes of Swan Lake and Swan River are the common trout, salmon trout, whitefish, Columbia chub, squawfish, blob, and the Columbia River sucker. Swan River is noted as one of the best trout streams in Montana."

The party visited also the several lakes known collectively as Dempsey's Lakes, lying at an elevation of about 9,000 feet above the sea, around the base of the rocky peak of Mount Powell. In the third lake, he says : " We found trout most abundant. As a result of less than two hours' fly-fishing, we took about one hundred and twenty-five, each weighing a half pound or less. It seemed to matter very little what was used for bait. Several good catches were made with bright colored leaves. All were caught in shallow water along the shore."

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* Report of the Commissioner of Fish and Fisheries respecting the establishment of fish-cultural stations in the Rocky Mountain region, etc. Washington, 1892, 8vo, 88 pp., 36 plates.

An interesting part of this paper is a new description of Two-Ocean Pass, located about long. 110° and lat. 44° 05'. "Standing upon the bank of either fork of Atlantic Creek, just above the place of the 'parting of the waters,' we tossed chips, two at a time, into the stream. Though the two chips would strike the water within an inch or so of each other, not infrequently one would be carried by the current to the left, keeping in Atlantic Creek, while the other might be carried a little to the right and enter the branch running across the meadow to Pacific Creek; the one beginning a journey which will finally bring it to the Gulf of Mexico, the other entering upon a long voyage in the opposite direction, to the Pacific. . . . During the night that we camped in Two-Ocean Pass (August 17–18) ice froze half an inch in a basin at our camp, and nearly as thick on a creek near by."

This pass was first mentioned by Capt. W. F. Reynolds in 1868. Capt. Jones (U. S. Engineers) described it in 1875, Dr. Hayden visited it in 1878, and Mr. Arnold Hague in 1884. Capt. Jones' and Dr. Hayden's maps of the region, also a modified drawing by Prof. Evermann, accompany this paper. The report contains besides a number of most interesting views of this little known territory.

PALEONTOLOGY IN CONGRESS.—Those gentlemen in and out of Congress who are unfriendly to the administration of the Government Geological Survey, had at least a temporary advantage in the recent discussion in the House of Representatives over the appropriations for the Survey for the next fiscal year.

On the motion of Representative Herbert, of Alabama, the paragraph in the appropriation bill making provision for paleontological work and the salaries of the paleontologist (Prof. O. C. Marsh) and assistant was stricken out, and in lieu thereof the following inserted :

" Provided, that after the 1st day of July, 1892, the Geological Survey shall not expend any money for paleontological work or researches."

Mr. Herbert, asserting that the chief work of the Survey was the construction of a geological map, and that paleontological work was not even necessary to the proper construction of such a map, inquired of what use the map would be when constructed? He claimed that it would cost $20,000,000, and that no man within the reach of his voice would ever see it completed, and that paleontology, paleobotany and even general researches into the science of geology are of no value whatever to the surveys which are intended to aid in the irrigation of our western country. Holding up a copy of Prof. Marsh's monograph on the *Odontornithes*, he said: " When you came to examine the book you found that it was simply going back to the past ages to show that at some prehistoric period of the world there existed birds of a certain type which had teeth. Such are the scientific problems we are paying these immense sums year after year to investigate." Mr. McMillan thought that money should not be expended "in hunting up bugs that are living on the fossiliferous carcasses of those that were dead before the flood."

The protest of the Director, Major Powell, produced no effect. In a letter to Representative Bingham, he said: "The paleontologic researches are imperatively necessary to the investigations carried on by the Geological Survey. It is impossible to classify the geologic formations of the country, to represent the same upon maps and to make a proper report, therein exhibiting the mineral values which they contain, unless these paleontologic investigations are made. Everywhere in America, in Europe, and even in Japan, geological surveys depend fundamentally upon paleontology. The geological formations are identified and known by the fossils which they contain, and it is not possible to make a geological survey without considering the facts thus brought to light. If in a lawsuit, by some misconception of legal practice, it should be decided to exclude evidence and to use only legal arguments in the trial of the case, a fair illustration would be afforded of excluding paleontologic researches from geologic investigations." Major Powell concluded with the remark that the Geological Survey had the most expert and thoroughly prepared corps of paleontologists ever organized in the world.

Mr. Holman, the chairman of the Committee on Appropriations, said, that a government like ours should keep abreast with the other progressive nations in scientific research. He thought that we kept well up, and as far as expenditure is concerned went beyond any other government, unless it might be France.

The "salary of the paleontologist" which the popular branch of Congress proposes to abolish, because it is a needless and wasteful expenditure of public money, is thus accounted for by the distinguished gentleman who has been the recipient of it.* "My connection with government work was not of my own seeking, but since I have been on the Geological Survey I have given my whole time to its service and have received no salary from any other source. Moreover, although my own means are limited, I have expended on the work in hand the greater part, if not all, the salary received from the Survey [$4,000]. Let me add that the pecuniary value alone of the vertebrate fossils I have collected for the Government far exceeds the amount expended on my division of the Geological Survey." Concerning the monograph on the *Odontornithes* he says that for the preparation of the volume, involving several years' work and several thousand dollars of his own money, he received no compensation whatever. Moreover, the illustrations were furnished at his own expense.

The discussions in Congress relating to the Geological Survey occurred between May 19 and 25. There appeared in April a pamphlet printed in Cambridge, Mass., entitled: "The Geological Map of the United States and the United States Geological Survey. By Jules Marcou." This pamphlet is a caustic criticism of the methods of the Survey, and an intemperate arraignment of every one connected with it, from director to doorkeeper. At pages 39–40 occur these passages: "The creation of a Division of Vertebrate Paleontology and the choice of Prof. Marsh were very injudicious and reveal incompetent direction as far as the interest of the geological map is concerned. . . . If the Geological Survey, instead of giving every year the large sum devoted to the division of vertebrate paleontology to only Messrs. Marsh and Newberry, had divided it equally among all the vertebrate paleontologists of the United States, it would have been simple justice to such able and good observers as Messrs. Cope, Scott, Osborn, Baur and St. John. But by far the best solution is to suppress entirely the division of vertebrate paleontology."

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* Prof. Marsh to Hon. J. H. Outhwaite.

The Institute of France recently awarded the Cuvier prize for 1891 to the collective work of the Geological Survey of the United States. The Committee of the Institute in making the award said: "Under the powerful impulse which the Federal Government has given it, the geologic service of the United States has produced in twenty-five years results very considerable and very skilfully attained. It must be said that in no other region of the globe have such discoveries been made in so short a space of time."

MAP OF ELEVATIONS.—The United States Geological Survey has recently issued a map of the United States showing the relief of the surface by means of shades of color. This map, which is compiled by Mr. Henry Gannett, is 31x20 inches; the scale is 110 miles to the inch. It distinguishes the areas below 100 feet, 100 to 500, 500 to 1,000, 1,000 to 2,000, 2,000 to 5,000, 5,000 to 8,000, 8,000 to 11,000 and above 11,000 feet. Although necessarily greatly generalized, this map expresses admirably the great features of relief of the country, in a manner never before attempted upon this scale, and is a notable contribution to the geography of the country. It should be distributed to all the schools in the land.

MOTHER MAPS.—The "mother" maps of the world, or at least as many of them as can be found in Washington, were recently brought together for public exhibition, through the instrumentality of the National Geographic Society. The map-collecting and map-publishing bureaus of the Government contributed specimens, excepting the Library of Congress, which probably has the most valuable if not the most extensive collection here. Of contributing bureaus, the U. S. Geological Survey had the greatest wealth, but other offices exhibited charts and maps of great scientific and historic value. It was a novel display at least, and suggests the educational value of a permanent exhibition of the kind where space and light might be liberally contributed—say, for instance, in the new building for the government library. Displays of all kinds are in prospect when that great building is completed. Could one be more instructive than that of the great maps of the world, from their earliest inception?

H.